

Focus. . .Medical Risk Factors and Pregnancy Outcome

Identification and management of medical risk factors along with education towards changes in lifestyle (e.g. diet, smoking, alcohol and illegal drug usage) are some of the key components of prenatal care. In 1989 Missouri added a check off list of medical risk factors during pregnancy to its birth certificate. In order to assess the relationship of these medical risk factors with pregnancy outcomes the linked hospital obstetrical patient abstract/live birth certificate data set was used because it provided a more complete surveillance of pregnancy risk factors than is available from the birth certificate alone.

The study population consisted of all Missouri resident singleton live births delivering in Missouri non-military hospitals for 1993-1995. The overall linkage rate between birth certificates and obstetrical hospitalizations for delivery was 98.5 percent with very little variation noted by race, order born, mother's education, marital status and geographic area. The lowest linkage rate (97.8 percent) for the above variables was noted for black mothers. For low birth weight (LBW) and infant deaths the linkage rates were 96.7 and 97.7 percent respectively.

The risk factors covered in this report are the same as the "Medical Risk Factors for this Pregnancy" section of the birth certificate and are presented in Table 1. The 'any medical risk factor' row in Table 1 covers all the individually noted risk factors presented plus the remainder of the 'Complications mainly related to pregnancy' section of the International Classification of Diseases' Ninth Edition (ICD-9) codes 640-648. The linked data set resulted in an 88 percent increase over the birth certificate in the reported incidence of the "Medical Risk Factors for this Pregnancy".

Table 1 shows one or more medical risk factors were noted for two out of every five pregnancies resulting in a live birth. The same incidence was noted for white mothers as for overall; while for black mothers medical risk factors were noted for over one-half of pregnancies resulting in live births.

Overall, the medical risk factors with the highest incidence were anemia and pregnancy-induced hypertension with rates of 72.3 and 61.8 per 1,000 live births respectively. These two risk factors also had the highest incidence for white mothers; however, their order was reversed. For black mothers the highest incidence of medical risk factors was noted for anemia (176.8), pregnancy-induced hypertension (82.1), and illegal drug use (52.0). Black mothers were more likely to have a higher incidence of most of the reviewed risk factors than white mothers with the greatest differentials noted for hemoglobinopathy (44 times and basically due to sickle cell disease/trait), followed by illegal drug use (6.3 times), anemia (3.4), alcohol use (2.4), chronic hypertension (2.0), and acute/chronic lung disease (1.9). White mothers were more likely than black mothers to have had a previous infant weighing greater than 4,000 grams (2.6 times), Rh sensitization (2.2), non-insulin dependent diabetes (1.8) and cardiac disease (1.3).

Table 2 shows the relative risk of having a LBW infant (less than 2,500 grams) by medical risk factors. Infants born to mothers with one or more of the risk factors were nearly six times more likely to be LBW as infants born to mothers without any of the risk factors. This was also the case for infants born to white mothers, while for infants born to black mothers the LBW risk was nearly 4.3 times greater for those with medical risk factors.

All medical risk factor specific relative risks for LBW were statistically significantly different from one except for those associated with cardiac disease, non-insulin dependent diabetes, genital herpes and Rh sensitization. Women having previous infants weighing greater than 4,000 grams were less likely to have a LBW infant which follows from the high correlation of sibling birth weights. Relative risks for LBW above 4.0 were noted for incompetent cervix, previous preterm/small-for-gestational age infant, uterine bleeding and eclampsia. Results were similar for white mothers except that the relative risk for LBW associated with cardiac disease became significant in a negative sense and the relative risk for LBW associated with genital herpes became significant in a positive sense. Also for white mothers the hemoglobinopathy specific relative risk for LBW was not significantly different from one. For black mothers the relative risk for having a LBW infant was lower than for white mothers for most of the medical risk factors reviewed and only incompetent cervix had an associated relative risk for LBW that was greater than four. These results partly reflect the fact that the underlying birth weight distributions for white and black infants are different with a normal healthy black infant on average weighing somewhat less than a normal healthy white infant.

Table 2 also shows the relative risk of having an infant death (ID) by medical risk factor. Overall, infants born to mothers with one or more of the medical risk factors were nearly four times more likely to die within the first year of life as infants born to mothers with none of the risk factors. The corresponding race-specific relative risk for infant death associated with having one or more of the medical risk factors was 3.39 and 4.84, respectively for white and black mothers.

Overall, the highest statistically significant relative risks for infant death were observed for incompetent cervix (17.48), uterine bleeding (8.34), and hydramnios/oligohydramnios (5.24). These three medical risk factors also presented as having the highest relative risk for infant deaths for each race group. The greatest racial differential in infant death relative risk was noted for hydramnios/oligohydramnios with the white RR being over twice that for black infants. All other racial differentials in infant death relative risks are small and/or are based on small numbers of infants deaths.

The incidence of medical risk factors is higher for black than white mothers, while the relative risks for LBW associated with these factors is higher for white mothers. It should be noted that there are other risk factors for LBW and infant death (e.g. smoking, underweight, low weight gain during pregnancy, prior infant death, not married) and that when those available are combined they have a higher incidence in black mothers without the medical risk factors than is the case for white mothers (84 versus 54 percent) (if unmarried is excluded the incidence drop to 56 and 48 percent respectively for black and white mothers) and this partly explains their lower relative risks for LBW.

Medical risk factors like pregnancy-induced hypertension, diabetes, and anemia are amenable to medical interventions and therefore should be positively influenced by prenatal care. To see if this is the case logistic regression models were developed to see the influence of adequate prenatal care on LBW and infant mortality for women having one or more of the medical risk factors and for some of the individual factors. Variables adjusted for in the models addressing all of the medical risk factors were smoking, underweight for height, weight gain less than 15 pounds, age less than 18, prior infant death and race. For the models looking at specific medical risk factors only race and all the medical risk factors minus the one being analyzed were used. Adequate prenatal care was defined as care starting within the first four months of pregnancy and five or more visits for preterm births and eight or more visits for pregnancies of 37 or more weeks. For that subset of mothers having one or more of the medical risk factors, adequate prenatal

care was associated with a 28 percent lower risk of having a LBW infant than mothers having inadequate prenatal care (RRa 0.72, 0.68-0.76). For the same subset of mothers, adequate prenatal care was associated with a 61 percent lower risk of having an infant death than mothers having inadequate prenatal care (0.39, 0.34-0.46). Similar results were found for the specific medical risk factors reviewed: anemia (LBW 0.66, 0.58-0.75; ID 0.44, 0.31-0.63), uterine bleeding (LBW 0.36, 0.28-0.47; ID 0.19, 0.12-0.30), incompetent cervix (LBW 0.14, 0.08-0.27; ID 0.08, 0.04-0.15), hypertensive conditions (LBW 0.85, 0.74-0.98; ID 0.54, 0.31-0.94), and insulin dependent and other diabetes (LBW 0.92, 0.63-1.33, ID 0.25, 0.09-0.73).

The importance of prenatal care for the identification and management of medical risk factors is strongly supported by the reduced relative risk for LBW and infant mortality observed with adequate care. That two of every five pregnant women have or develop one or more of the risk factors reviewed and that they represent four-fifths of LBW births and nearly three-fourths of infant deaths adds importance to the need for adequate prenatal care for all pregnant women. These results must be tailored with the fact that there are other risk factors that are associated with the pregnancy outcomes reviewed and that association is not causation. Also, there is potential for bias in that the medical risk factors reviewed could be over/under reported depending on the outcome of the pregnancy.

Table 1
Incidence of Selected Obstetrical Medical Risk Factors by Race:
Missouri Resident Singleton Live Births Recorded in Missouri
Non-Military Hospitals 1993-1995

<i>Maternal Medical Risk Factor</i>	<i>ALL Races Number</i>	<i>Rate*</i>	<i>White Number</i>	<i>Rate</i>	<i>Black Number</i>	<i>Rate</i>
Anemia	14,678	72.3	8,625	51.9	5,844	176.8
Cardiac disease	2,819	13.9	2,424	14.6	360	10.9
Acute/chronic lung disease	3,476	17.1	2,477	14.9	919	27.8
Diabetes (insulin dependent)	1,469	7.2	1,057	6.4	385	11.6
Diabetes-other	4,022	19.8	3,356	20.2	528	16.0
Genital herpes	2,157	10.6	1,608	9.7	534	16.2
Hydramnios/ oligohydramnios	5,854	28.8	4,300	25.9	1,440	43.6
Hemoglobinopathy	658	3.2	68	0.4	581	17.6
Hypertension, chronic	2,433	12.0	1,736	10.5	676	20.5
Hypertension, pregnancy induced	12,539	61.8	9,668	58.2	2,712	82.1
Eclampsia	290	1.4	235	1.4	51	1.5
Incompetent cervix	739	3.6	555	3.3	169	5.1
Previous infant GT 4,000 grams**	3,002	14.8	2,754	16.6	209	6.3
Previous preterm/SGA**	2,971	14.6	2,185	13.2	729	22.1
Renal disease	884	4.4	661	4.0	208	6.3
Rh sensitization	4,890	24.1	4,470	26.9	396	12.0
Uterine bleeding	2,255	11.1	1,835	11.0	372	11.3
Illegal drugs	3,133	15.4	1,390	8.4	1,719	52.0
Alcohol	4,016	19.8	2,689	16.2	1,280	38.7
Any risk factor***	85,421	420.7	65,407	393.7	18,538	560.9

* per 1,000 live births
 ** from birth certificates only
 *** Any of above risk factors plus the remaining "Complications Mainly Related to Pregnancy" subcategory of the International Classification of Diseases codes 640-648.

Table 2
Relative Risk for Low Birth Weight and Infant Mortality by
Selected Medical Risk Factors by Race:
Missouri Resident Singleton Live Births Recorded in Missouri
Non-Military Hospitals 1993-1995

<i>Maternal Medical Risk Factor</i>	<i>ALL Races</i>				<i>White</i>				<i>Black</i>			
	<i>Low Birth Weight</i>		<i>Infant Deaths</i>		<i>Low Birth Weight</i>		<i>Infant Deaths</i>		<i>Low Birth Weight</i>		<i>Infant Deaths</i>	
	#	RR	#	RR	#	RR	#	RR	#	RR	#	RR
Anemia	1,410	1.62*	159	1.69*	584	1.36*	80	1.70*	812	1.22*	77	1.13
Cardiac disease	197	1.13	16	0.84	146	1.19*	12	0.87	50	1.18	4	0.93
Acute/chronic lung disease	419	1.98*	38	1.64*	255	2.07*	23	1.66*	154	1.43*	14	1.29
Diabetes (insulin dependent)	127	1.40*	12	1.22	70	1.31*	8	1.34	55	1.21	4	0.87
Diabetes-other	245	0.99	17	0.62	177	1.04	13	0.68	54	0.86	4	0.63
Genital herpes	104	0.78	7	0.48	52	0.64*	3	0.33	52	0.82	4	0.62
Hydramnios/oligohydramnios	1,263	3.77*	184	5.24*	929	4.68*	134	6.25*	316	1.93*	45	
Hemoglobinopathy	93	2.30*	5	1.13	6	1.75	0	-	84	1.23*	5	0.72
Hypertension, chronic	405	2.75*	27	1.66*	243	2.82*	12	1.22	157	2.00*	15	1.89*
Hypertension, pregnancy induced	2,046	2.96*	76	0.90	1,367	3.14*	54	0.99	638	2.18*	22	0.66
Eclampsia	73	4.09*	1	0.51	52	4.40*	1	0.75	20	3.33*	0	-
Incompetent cervix	263	5.86*	82	17.48*	167	6.05*	48	16.03*	90	4.59*	32	17.15*
Previous infant GT 4,000 grams**	56	0.30*	19	0.94	40	0.28*	13	0.83	14	0.57*	4	1.61
Previous preterm/SGA**	803	4.60*	52	2.67*	488	4.63*	31	2.56*	300	3.69*	21	2.49*
Renal disease	154	2.84*	12	2.03*	100	3.02*	8	2.15*	50	2.05*	4	1.62
Rh sensitization	289	0.96	25	0.76	246	1.09	23	0.91	41	0.87	2	0.42
Uterine bleeding	589	4.38*	117	8.34*	419	4.70*	77	7.98*	156	3.65*	36	8.81*
Illegal drugs	694	3.73*	60	2.93*	181	2.61*	16	2.05*	507	2.72*	43	2.23*
Alcohol	605	2.51*	52	1.96*	240	1.79*	24	1.59*	357	2.50*	28	1.89*
Any medical risk factor***	10,195	5.95*	1,013	3.95*	6,703	6.08*	647	3.39*	3,308	4.31*	340	4.84*

Total number	12,556	1,366	8,402	941	3,909	395
Any medical risk factor as percent of total poor outcomes	81.2	74.2	79.8	68.8	84.6	86.1

RR - relative risks

* Significant at or beyond the 0.05 level.

** Acquired from birth certificate only.

*** Any of the above risk factors plus the remaining "Complications Mainly Related to Pregnancy" subcategory of the International Classification of Disease codes 640-648.

Provisional Vital Statistics for March 1997

Live births increased in March as 6,599 Missouri babies were born compared with 5,902 in March 1996. The birth rate increased from 13.0 to 14.0 per 1,000 population between these two time periods.

Cumulative births for the 3- and 12-month periods also show increases. For the first quarter of the year, births increased by nearly 5 percent from 18,708 to 19,608.

Deaths decreased slightly in March as 5,015 Missourians died compared with 5,169 one year earlier.

Cumulative deaths for the 12 months ending with March show a slight decrease from the previous year.

The **Natural increase** in March was 1,584 (6,599 births minus 5,015 deaths), about double the number in March 1996.

Marriages and dissolutions of marriage increased in March, but both decreased for the 12 months ending with March.

Infant deaths were the same in March as the previous March (53). However, cumulative infant deaths increased for the 3- and 12-month periods ending with March. For the first quarter, the infant death rate rose from 7.3 to 8.7 per 1,000 live births.

PROVISIONAL RESIDENT VITAL STATISTICS FOR THE STATE OF MISSOURI

Item	March				Jan. - Mar. cumulative				12 months ending with March				
	Number		Rate*		Number		Rate*		Number		Rate*		
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1995	1996	1997
Live Births	5,902	6,599	13.0	14.0	18,708	19,608	14.0	14.7	73,297	73,443	14.1	13.8	13.7
Deaths	5,169	5,015	11.4	10.6	15,416	15,482	11.6	11.6	54,623	54,159	10.0	10.3	10.1
Natural increase	733	1,584	1.6	3.3	3,292	4,126	2.5	3.1	18,674	19,284	4.1	3.5	3.6
Marriages	2,544	2,743	5.6	5.8	8,056	8,279	6.0	6.2	45,799	45,129	8.5	8.6	8.4
Marriages	2,544	2,743	5.6	5.8	8,056	8,279	6.0	6.2	45,799	45,129	8.5	8.6	8.4
Dissolutions	2,080	2,182	4.6	4.6	6,785	6,036	5.1	4.5	26,565	25,959	4.9	5.0	4.8
Infant deaths	53	53	9.2	8.7	140	165	7.3	8.7	544	591	7.9	7.4	8.0
Population base (in thousands)	...	...	5,359	5,395	...	...	5,359	5,395	...	...	5,286	5,329	5,368

*Rates for live births, deaths, natural increase, marriages and dissolutions are computed on the number per 1000 estimated population. The infant death rate is based on the number of infant deaths per 1000 live births. Rates are adjusted to account for varying lengths of monthly reporting periods.

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